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THE GEORGIA ACADEMY OF SCIENCE

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PROGRAM NUMBER

TWENTY-FOURTH ANNUAL MEETING

OF

THE GEORGIA ACADEMY OF SCIENCE

Y. M. C. A. BUILDING
THE GEORGIA SCHOOL OF TECHNOLOGY
ATLANTA, GEORGIA

APRIL 12, 1947

PROGRAM

MORNING

9:00 Business Meeting of the Academy
Y.M.C.A. Building, Georgia School of Technology
Report by Dr. A. L. McLendon on the Junior Academy

10:00 Reading of Papers—Chairman, Dr. S. M. Christian
Y.M.C.A. Building, Georgia School of Technology

AFTERNOON

1:00 Dinner—Vice-President W. B. Redmond, presiding
Biltmore Hotel
Speaker: President Josiah Crudup
Subject: The Cultural and Social Evaluation in the New Age of Science

2:30 Reading of Papers—Chairman, Dr. E. H. Dixon
Y.M.C.A. Building, Georgia School of Technology

SPECIAL NOTICE: Members are requested to notify Dr. W. B. Redmond, Department of Biology, Box 534, Emory University, Ga., by postcard whether or not they will attend the dinner.

MESSAGE OF THE SECRETARY

The Georgia Academy of Science welcomes the Junior Academy to its meeting this year for the first time. The efforts of Prof. McLendon and his committee during the past year have made real the development of the Junior Academy whose foundation was laid before the war; public recognition appears on our program. The two top winning papers in the Junior Academy are given place in the Senior Academy program; and the Junior Academy has a program of its own on Saturday afternoon.

The Academy, which has always been comparatively small, has grown more during the past year than during any one year since its organization. Twenty-six new members are already on the rolls for this year. The total membership at the time of publication is one hundred and ninety-two.

It is hoped that all addresses have been corrected, but for the information of members, it may be stated that a great many changes of addresses have occurred during the last three years and that as many as four different addresses have been on the books for each of several of our members. It is hoped that corrections on the addressograph can be made not oftener than once a year, and that excessive changes in addresses will not continue to occur.

The organization of the Georgia Psychological Association has been noted in the preceding issue of the Bulletin and it is hoped that this organization will affiliate with the Georgia Academy. Its charter members, who are all members of the American Psychological Association, have been elected members of the Academy.

Of special interest this year is the effort of science teachers to improve science teaching in the state of Georgia, and it is hoped that the Academy will send a committee to the meeting of the Georgia Educational Association in Savannah, April 25th and 26th, to cooperate in this work.

A small number of members have dropped from the Academy, some of them having moved to other states, three at their own request, and three for non-payment of dues.

Members will note some change in plans from the original announcement: the change in time was for the sake of the Junior Academy which could meet on Saturday and might not have been able to meet on Friday; the change to the campus of the Georgia School of Technology was made to save unnecessary expense to the Academy.

A. S. E.

PAPERS

The prize winners in the Junior Academy Contest, one boy and one girl, will be given 20 minutes each on this program.

Finger Tremor as a Sensitive Indicator

A. S. EDWARDS, Department of Psychology, University of Georgia

20 minutes

Finger Tremor accurately measured in three dimensions appears to be a more sensitive indicator of psycho-somatic changes than any other easily available means. Finger Tremor has been doubled or more than doubled by such stimulation as smoking and inhaling, climbing stairs, and preliminary experiments suggest that the same results may be produced by the arousal of emotional states by two different methods. Results of experiments already performed will be discussed, and possible results of experiments in progress will be suggested.

The Incidence of Nervous Habits Observed in 1520 Students

FLORENE M. YOUNG, University of Georgia

15 minutes

The author, using the time-sampling technique standarized by Willard Olson, recorded the incidence of twelve specified nervous habits of 1520 University student. The manifestations were tabulated under three major headings, Oral, Facial, and Nasal-Hirsutal. Observations began in 1939 and ended in June of 1946, making possible intercomparisons of the periods described as pre-war, war, and terminal war years.

Oral scores were larger than those in the other two categories, but they were smaller than those obtained by Olson for children in similar observations of 100 minutes for each group.

During the war years the three types of nervous habits increased as compared with the pre-war years. All groups in the terminal war years likewise had larger scores than did those in the pre-war period.

The groups, Freshman Girls, Non-Freshman Girls and All Boys had records which varied somewhat from year to year. The scores of the groups in the prewar period did not show as many significant differences as were evident in the war years. During the latter period Non-Freshman Girls and Boys had larger scores than did Freshman Girls.

The incidence of Oral nervous habits was found to be markedly greater for Girls than for Boys, but Boys had larger Facial scores and larger Nasal-Hirsutal scores.

The Effects of Maze Rotation on Learning

MAURICE CURTIS LANGHORNE, Emory University

15 minutes

102 college students, 68 men and 34 girls, learned to two perfect trials the lower part of the Miles Two-story maze. All subjects learned the original or O position and then were assigned to groups. The assignment followed no selective principle. The first group learned the maze in four additional positions on successive days with a 90 degree counterclockwise rotation each day; the second group learned only the 90 degree position 24 hours later; the third group repeated the original position after 24 hours; the fourth repeated the original position after a four day interval. Trials, time, and errors were measured. Data are presented in three ways: the absolute differences between men and girls for the original position; the mean per cent of gain for each group for each position; and, the per cent gain for each individual for each change.

The men learned the original position with greater ease than the girls; the differences being significant statistically. These sex differences were not significant for the other positions. The first 90 degree rotation produced significant disturbances in the learning of the girls when compared with those repeating the original position after the same interval. The men were disturbed, but not so greatly. Each successive change in position of the maze caused less disturbance. The four day interval between learning the O position and repeating it did not produce results in any way different from learning the original position and repeating it one day later.

Slides

A Preliminary Study of the Effect of Alcohol on Conditioned Reactions in An Inhibited Dog

W. T. JAMES, Department of Psychology, University of Georgia

15 minutes

In the course of a long series of studies on conditioned reactions in dogs it has been found that they fall into three general types; inhibited; excitable, and an intermediate group which is well balanced. The latter type is the best to use in general laboratory experiments. The excitable dogs are most difficult to work with since they give vigorous conditioned reactions and in general become disturbed by the laboratory procedure. The inhibited type, on the other hand, resist conditioning; they do not respond to the signals, and seem to develop a 'set' against the conditioning procedure. In the present series of studies interest is in making a more careful analysis of the inhibited type. The attempt is being made to see how various drugs operate in releasing the inhibitory 'set', and in making it possible to get conditioned responses in such dogs.

The present report deals with the effect of alcohol on one of these animals. The indications are that there is a certain dosage of alcohol, which when given previous to the experimental period, releases inhibition in some way so that conditioned responses occur, while on days in which no alcohol is used, conditioned responses are either absent, or greatly reduced.

Slides

A Note on the Scholastic Achievement and Adjustment of Fifty Neuropsychiatric Veterans of World War II Attending the University of Georgia

R. T. OSBORNE, Department of Psychology, University of Georgia

15 minutes

A study of a cross-section of fifty neuropsychiatric World War II veterans attending the University of Georgia indicates that veterans with psychological disabilities are not making entirely satisfactory adjustment to the prescribed University curriculum. The rated disability of 80% of the group studied was psychoneurosis ranging in severity from 0% to 60%. Hysteria and anxiety reaction were the most frequent types of psychoneurosis reported. Ten per cent were diagnosed as having either dementia praecox or manic-depressive psychosis.

From the records of the Registrar and the Veterans Guidance Center, it was found that the average veteran of the group examined is 23.6 $\pm$4.2 years of age, completed 11.78 $\pm$ 1.35 years of educational training before entry into service, and was in service for an average of 23.2 $\pm$13.3 months, with 7.1 $\pm$7.8 months' overseas duty. The average disability for the group upon separation from service was rated at 32.5%. $\pm$18.4 College marks for the group average 66.6 $\pm$18.2 with 1.06 $\pm$1.28 failure per student.

Plot Size and Stock Importance in Peach Experiments

T. H. McHATTON, Department of Horticulture

10 minutes

It has been demonstrated in the experimental Elberta orchard at the University of Georgia that groups of 4 to 6 trees will give as significant pomological results as may be obtained from groups of trees running from 25 to 47. The correlation between the yields of the small and large groups was found to be .837$\pm$.19 when the average results from seven crop years was studied.

A study of the individual yields and behavior of 376 Elberta peach trees through ten years and seven crop years leads to the belief that the great variable in orchard peach trees is the stock. The average yields of plants in the same plot for seven years varied from 92.09 to 364.95 pounds or from 161.92 bushels to 651.52 bushels on an acre basis of 88 trees.

Maxima and Minima of Sums

TOMLINSON FORT

20 minutes

The calculus of variations is concerned with the problem of maxima and minima of definite integrals. The definite integral is the limit of a sum and the present paper treats maxima and minima of sums by methods not dissimilar to those commonly applied to the integral, except that methods of the calculus of finite differences replace those of differential and integral calculus.

Application is made to a number of practical problems.

Morton's Toe Syndrome

J. H. KITE, The Scottish Rite Hospital for Crippled Children

20 minutes

Thomas G. Morton of Philadelphia described a "peculiar and painful affection of the fourth metatarso-phalangeal articulation" in 1876. There were certain cases which could not be helped by any form of treatment. A number of writers since have mentioned those cases which would not respond to treatment.

Recently it has been found that this resistant group had a nerve tumor which was causing the trouble, and that by removing the tumor, the pain was completely relieved.

In order to identify the Morton's Toe Syndrome and separate it from the other varieties of metatarsalgia, I have analyzed the signs and symptoms of eight cases on whom I have removed this tumor.

All were women. All referred their pain to the third and fourth toes, mentioning the fourth toe first as a rule. The pain began in the metatarso-phalangeal joint and spread to the dorsum of the foot. Sometimes the toes felt numb or dead. The pain always came in attacks and was sharp and sticking in character. It was so severe it would make them cry and one case would faint. The most characteristic finding in all these cases is the irresistable desire to remove their shoes. They will stop on the street when they have an attack and take off their shoe and rub the foot. All gave a history of removing the shoe in public. This condition occurs in feet with normal architecture. The average age was 47. In all cases the pain gradually increased. There is no tendency toward a spontaneous cure. All of these had been to doctors and chiropodists without relief and had tried all of the usual things which help the other forms of metatarsalgia.

The tumor can be removed under local anesthesia through an incision between the third and fourth toes. The tumor has been found in every case. No one has had a recurrence of the original pain, and all say that they can now wear any type of shoe without fear of pain.

The Development of Cataracts Due to Histidine Deficiency in the Rat

W. KNOWLTON HALL, LESTER L. BOWLES and V. P. SYDENSTRICKER, Departments of Biochemistry, Microanatomy and Medicine, University of Georgia School of Medicine, Augusta, Georgia

10 minutes

In a study of the effects of histidine deficiency in the rat, a diet was used consisting of a mixture of the other essential amino acids supplying approximately three times the minimum requirement of each, 4% of a salt mixture, 2% of Cod liver oil, 3% of cottonseed oil, sucrose, and in each 100 gm.: riboflavin 1.6 mgm., calcium pantothenate 2 mgm., pyridoxin hydrochloride 0.4 mgm., thiamine hydrochloride 0.4 mgm., and choline chloride 200 mgm. The anterior portions of the eyes of 8 rats from different litters on the

deficient diet and of 8 control rats fed the same diet, but with histidine added, were examined thrice weekly with the biomicroscope.

Of the rats on the histidine-deficient diet, 5 developed dense lenticular opacities. The lenticular opacity was first central and then spreading peripherally until a dense cataract occupied a large proportion of the lens area. The appearance and development of the cataract were quite distinct from those due to tryptophane or riboflavin deficiencies.

No lenticular changes were observed in the control rats.

(This study was aided by grants from the John and Mary R. Markle Foundation and from the U. S. Public Health Service).
Lantern Slides

A Study of Chlorine Dioxide

ROBERT S. INGOLS

20 minutes

The need for safe yet pleasant tasting water for drinking has directed attention toward chlorine dioxide as an adjunct or substitute for chlorine in water treatment. Chlorine dioxide can be produced in solution from chlorine and sodium chlorite. Its residuals can be determined by the same techniques as used for chlorine with some special precautions. Solubility data indicate that the molecule is unionized in water solution, but a concentrated freshly prepared solution of the gas yields a small amount of hydrogen ions indicating a possible equilibrium with chlorons and chloric acids.

A comparison of the chemical reaction properties of chlorine dioxide in relation to chlorine indicates that chlorine dioxide reacts less rapidly than chlorine with phenol, peptone, dextrose and alcohol and that it does not react with ammonia. A determination of the chlorine dioxide demand of peptone over a wide range of concentrations indicates that the degree of reaction agrees with the amount that would be removed by an adsorption of the gas by the peptone. The greater effectiveness of chlorine dioxide over chlorine as a bactericide in spite of its lower redox potential and lesser reactivity towards most chemical materials is apparently a function of this property of adsorption.

The Use of Tetraethylammonium Chloride in the Treatment of Experimental Acute Arterial Insufficiency

R. L. ROBERTSON, Emory University Hospital

15 minutes

This paper reports a series of experiments undertaken to test the efficacy of chemical blockade of autonomic ganglia by the action of the tetraethylammonium ion in experimentally produced acute arterial insufficiency.

It is not a comparison of this method with other established procedures.

The prevalence of arterial injury in World War II has lead to a reconsideration of its therapy. This is directed toward: restoration of continuity of artery by operative means or augmentation of secondary or collateral circulation.

Collateral circulation is frequently insufficient due to vasospasm in arterial tree. Removal of vasopressor outflow from intact sympathetic nervous system has been shown to markedly increase collateral circulation. This can be done by procaine nerve block, blockade of ganglia, or by operative removal of sympathetic chain.

Recently, attention has been directed toward a new drug, tetraethylammonium chloride, the locus of action of which is the autonomic ganglion. It acts to prevent the passage of both sympathetic and parasympathetic impulses across the ganglion. It establishes, in effect, a chemical blockade of all autonomic ganglia, when introduced into the body parenterally .

Thirty animals (adult mongrel dogs) constitute this experimental group. Identical operative procedures were conducted on all animals under aseptic conditions. The terminal aorta below the inferior mesenteric artery was resected along with its three terminal trunks, and the deep circumflex iliac arteries also ligated. In the control group of ten dogs this produced severe arterial insufficiency which was fatal in 90% of the animals. To the remaining group of twenty, 25 mg. per kilogram body weight of tetraethylammonium chloride was given intramuscularly every eight hours for three days. Fourteen animals of this group survived and exhibited functional recovery in two to six days. Six of the twenty dogs died, three of infection, and three post-operatively, cause undetermined. No deaths in the series were due to hemorrhage or peritoneal infection.

The results of these experiments appear to furnish further evidence for the rationale of removing sympathetic tonus of the arterial system in the treatment of arterial insufficiency. These observations indicate that chemical blockade of autonomic ganglia with tetraethylammonium chloride may be of value in acute arterial insufficiency following arterial injury.

The Influence of Estrogenic Substances Upon the Cardiovascular System

R. A. WOODBURY and DAVID MARSH (now with the University of West Virginia, Morgantown). Department of Pharmacology, University of Georgia School of Medicine, Augusta, Georgia

15 minutes

In cats, dogs, rabbits, and humans, large doses of stilbestrol daily for 1 to 4 days, modifies the response of the cardiovascular system to acetylcholine, epinephrine, histamine, pitocin, and pitressin. Blood pressure tracings from non-anesthetized animals and patients suplied the prestilbestrolized response to measured doses of these drugs. Repeating the observations after administrations of stilbestrol to the same animal or individual showed that the sensitivity to these substances was generally increased by two to ten fold; and a hundred fold increase was observed in some animals.

These studies were supported by financial grants from Eli Lilly and Company and Ciba Pharmaceutical Company.

Lantern

The Influence of Stilbestrol on the Uterine Muscle

BERTHA HOBENSACK, RAYMOND P. AHLQUIST, and R. A. WOODBURY, Department of Pharmacology, University of Georgia School of Medicine, Augusta

10 minutes

The isolated uterus of the virgin rabbit is commonly used as a test organ for evaluating the action of many types of drugs. The uterus is removed from the sacrificed animal and the two horns are divided and suspended in a warm (37.5° C.) bath of oxygenated Locke-Ringer saline solution. The activity of the muscle is recorded by means of a lever writing on smoked paper.

The pre-treatment of the rabbit with stilbestrol (a synthetic estrogen) increased the sensitivity of the uterus. The uteri from untreated animals are often unresponsive to any stimulus. After intramuscular administration of 0.005 to 0.01 mgm. of stilbestrol every other day for periods up to seven days the uteri increase in size, vascularity and sensitivity to stretch, Pitocin, Pitressin, epinephrine, acetylcholine, histamine and other drugs.

Records will be shown demonstrating this increase in sensitivity and the pharmacological importance of this phenomenon will be discussed.

Lantern

Cyclic Changes in Human Uterine Pressure Curves and the Influence of Distention and Pitressin upon These Curves

GEORGE P. CHILD, R. A. WOODBURY, RICHARD TORPIN, W. S. BOYD, J. L. ALLGOOD, J. C. NEAL and H. L. CHESHIRE. Departments of Pharmacology and Obstetrics and Gynecology, University of Georgia School of Medicine, Augusta, Georgia

15 minutes

The contraction patterns of the human uterus were studied by introducing small water filled balloons into the uterus and recording the pressure changes in the balloons with a Hamilton Manometer. The effects of different drugs and hormones were obtained at various times during the menstrual cycle. The uteri were also subjected to slight distention by increasing the balloon volume. The contraction patterns and drug effects were compared with the non-distended uterus.

Although the prevailing patterns of high frequency and low amplitude were obtained during the estrogenic phase and low frequency high amplitude were obtained during the secretory phase, all variations between these types were found. In most patients it was possible to change the estrogenic type to the secretory type by distention.

There was a very low correlation between uterine tone and contraction amplitude. This correlation was increased by pitressin as well as by distention. With very few exceptions both distention and pitressin increased the tone and amplitude of contractions. Pitressin invariably eliminated any relaxed period if present in the control. Distention also increased the sensitivity of the uterus to pitressin.

The addition of 2 cc. to a uterus containing 4 cc., made it possible for 0.1 unit pitressin to produce the same effect as 0.3 units.

These studies were supported by financial grants from Frederick Stearns & Company.

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An Optical Lever for Recording the Activity of the Perfused Isolated Mammalian Heart

RAYMOND P. AHLQUIST, Department of Pharmacology, University of Georgia School of Medicine, Augusta, Georgia

10 minutes

In studying the influence of drugs on the perfused isolated mammalian heart it is necessary to record both changes in perfusion rate (coronary flow) and changes in the rate and amplitude of muscular contractions. The usual method has been to record the perfusion rate by timing a measured amount of perfusate. The activity of the myocardium is then recorded by means of a regular heart lever writing on smoked paper. Electronic, optically recording, flowmeters have been developed which can be used to measure the perfusion rate accurately and continuously. It is necessary therefore to have a heart lever which can be used to simultaneously record the activity of the muscle optically.

The lever to be described is essentially a ball bearing mounted muscle lever; one arm consisting of a light beam. Light from a suitable light box is reflected from a small mirror on the short arm of the lever. Since the heart causes the lever to travel in a vertical direction and since the camera slit is horizontal a prism system is used to rotate the light from the mirror 90 degrees.

Several recordings of the action of various drugs on the isolated rabbit heart will be shown.

Lantern